WHAT IS CLAIMED IS:

1. A frequency translator, comprising:

a phase accumulator; and

a CORDIC phase rotator coupled to the phase accumulator comprising N stages, each stage having an inphase (I) input, a quadrature (Q) input and a phase angle (θ) input, each stage further comprising a first adder to compute a quantity $I \pm 2^{-k} Q$, a second adder to compute a quantity $Q \pm 2^{-k} I$ and a third adder to compute $\theta \pm \phi_k$, where each stage outputs the sum generated by each adder to be used as inputs to a succeeding stage, and wherein the N^{th} stage outputs an inphase component and a quadrature component from its first and second adders respectively that correspond to an input vector rotated by a desired phase angle.

2. The frequency translator recited in claim 1, further comprising means for stochastic rounding of values output by the CORDIC phase rotator where the CORIDC phase rotator uses higher precision arithmetic than subsequent portions of the frequency translator.

3. The frequency translator recited in claim 2, further comprising means for adding a dither signal to a rounded output of the stochastic rounding means prior to inputting the rounded output to a digital-to-analog converter to compensate for nonlinearities in the digital-to-analog converter.

4. The frequency translator recited in claim 3, further comprising means for removing the dither signal from the output of the digital-to-analog converter.

5. A modem, comprising:

a transmit side for transmitting a signal, the transmit side comprising:

a digital-to-analog converter; and

a frequency translator to translate the signal to a frequency suitable for transmission, wherein the frequency translator comprises:

a CORDIC phase rotator;

means for stochastic rounding of values output by the CORDIC phase rotator where the CORIDC phase rotator uses higher precision arithmetic than subsequent portions of the frequency translator; and

means for adding a dither signal to a rounded output of the stochastic rounding means prior to inputting the rounded output to the digital-to-analog converter; and

a receive side for receiving a signal, the receive side comprising:

an analog-to-digital converter; and

a frequency translator to translate the signal from a transmission frequency to a frequency suitable for processing, wherein the frequency translator comprises:

a CORDIC phase rotator; and

means for stochastic rounding of values output by the CORDIC phase rotator where the CORIDC phase rotator uses higher precision arithmetic than subsequent portions of the frequency translator.

6. The modem recited in claim 4, wherein there is a single CORDIC phase rotator that is shared by the frequency translators of the transmit and receive sides of the modem.

7. The modem recited in claim 4, wherein the transmit side further comprises means for removing the dither signal from the output of the digital-to-analog converter.

8. The modem recited in claim 5, wherein the frequency suitable for processing is baseband.

9. A method for translating a signal in frequency, comprising the steps of:

initializing a phase accumulator with an initial phase angle;

applying an output of the phase accumulator an N-stage CORDIC phase rotator;

calculating a quantity $I \pm 2^{-k} Q$ in each stage of the N-stage CORIDC phase rotator;

calculating a quantity $Q \pm 2^{-k} I$ in each stage of the N-stage CORDIC phase rotator;

calculating a quantity $\theta \pm \phi_k$ in each stage of the N-stage CORDIC phase rotator,

inputting to each successive stage of the N-stage CORIDC processor after the first stage an inphase (I) component, a quadrature (Q) component and phase angle θ, each of which is output by the preceding stage;

inputting to a first stage of the N-stage CORDIC processor an inphase component and a quadrature component of a complex-valued sample of the signal to be translated in frequency, and a phase angle by which to rotate the complex-valued sample of the signal;

outputting from a last stage of the N-stage CORDIC processor an inphase component and a quadrature component of the complex-valued sample of the signal to be translated in frequency rotated by approximately the angle stored in the phase accumulator; and

adjusting the phase accumulator by an incremental phase value to achieve a frequency translation of the signal to be translated in frequency.

10. The method recited in claim 9, further comprising the step of stochastic rounding values output by the CORDIC phase rotator where the CORIDC phase rotator uses higher precision arithmetic than subsequent portions of the frequency translator.

11. The method recited in claim 10, further comprising the step of adding a dither signal to a rounded output of the stochastic rounding means prior to inputting the rounded output to a digital-to-analog converter to compensate for nonlinearities in the digital-to-analog converter.

12. The method recited in claim 11, further comprising the step of removing the dither signal from the output of the digital-to-analog converter.

13. A method for transmitting a signal, comprising the steps of:

generating a digital representation of the signal to transmit;

applying successive complex-valued samples of the signal to a CORIDC phase rotator;

rotating each complex-valued sample by phase angle to achieve a desired frequency translation;

stochastically rounding the rotated complex-valued samples;

adding a dither signal to the stochastically rounded samples to generate a transmission signal;

converting the transmission signal to an analog transmission signal; and

transmitting the analog transmission signal.

14. The method recited in claim 13, wherein the stochastic rounding step is performed only if the CORDIC phase rotator use higher precision operations than subsequent processing operations.

15. The method recited in claim 13, further comprising the step of the removing the dither signal after converting the transmission signal to analog.

16. A method for receiving a signal, comprising the steps of:

receiving the signal;

converting the signal to a digital representation;

applying successive complex-valued samples of the digital representation to a CORIDC phase rotator;

rotating each complex-valued sample by phase angle to achieve a desired frequency translation; and

stochastically rounding the rotated complex-valued samples.

17. The method recited in claim 16, wherein the stochastic rounding step is performed only if the CORDIC phase rotator use higher precision operations than subsequent processing operations.

18. The method recited in claim 16, wherein the desired frequency translation is a frequency translation to baseband.